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ABSTRACT

Younger students live in a media-centric world. Researchers have shown that youth today spend more time watching television and movies than most any other leisure-time activity (Pearl, 1982). In addition, the presentation speed of passages on commercial television has increased significantly in the past 50 years (Stephens, 1996). Researchers have shown that viewers automatically learn to cope with symbolic presentation methods through repeated exposure to television and visual patterns (Abelman, 1995; Bargh, 1998; Carr, 1982). Because of their increased exposure to rapid sequence and presentation speed brought on by fast-cuts/montage found in television programs aimed at youth, it may also be assumed that these individuals can comprehend these messages on a much wider scale than can their adult counterparts. One cannot assume that exposure to rapid presentation speed is simply a passive viewing activity. Further, not only are these advancements in media technology changing the way viewers look at and interpret video media, but most importantly, the widespread availability of production techniques provide easy access to capabilities that allow people to use video media to easily create their own content. It has been widely shown fashion (Tyner, 1998) that these acquisition/production opportunities also increase exponentially one's ability to comprehend content delivered in like. Media educators and theorists for years have been analyzing Marshall McLuhan's famous quip, "the medium is the message." In some regard, McLuhan's statement may be a retort to later critics of educational media like Richard Clark (1983) who claimed that media are "mere vehicles that deliver instruction but do not influence achievement any more than the truck that delivers groceries causes changes in nutrition" (p.445). Further, communications theorists like Walter Ong (1982) not only agreed with McLuhan, but extended the meaning of McLuhan's message to also imply that the types of media people use define the way they think. Ong's notions bring to mind possible questions as to whether today's mediacentric youth perhaps think differently than previous generations, with implications as to the kinds of instructional strategies that will be successful in motivating them to learn and providing perceptual stimuli for recognition and recall. (Contains 68 references.) (Author/AEF)

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Teaching, Learning, and Communicating in the Digital Age

By: Robert Kenny

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TEACHING, LEARNING, AND COMMUNICATING IN THE DIGITAL AGE

Robert Kenny
University Of Florida

Abstract

Younger students live in a media-centric world. Researchers have shown that youth today spend more time watching television and movies than most any other leisure-time activity (Pearl, 1982). In addition, the presentation speed of passages on commercial television has increased significantly in the past fifty years (Stephens, 1996). Researchers have shown that viewers automatically learn to cope with symbolic presentation methods through repeated exposure to television and visual patterns (Abelman, 1995; Bargh, 1988; Carr, 1982). Because of their increased exposure to rapid sequence and presentation speed brought on by fast-cuts/montage found in television programs aimed at youth, it may also be assumed that these individuals can comprehend these messages on a much wider scale than can their adult counterparts. One cannot assume that exposure to rapid presentation speed is simply a passive viewing activity. Further, not only are these advancements in media technology changing the way viewers look at and interpret video media, but most importantly, the widespread availability of production techniques provide easy access to capabilities that allow people to use video media to easily create their own content. It has been widely shown fashion (Tyner, 1998) that these acquisition/production opportunities also increase exponentially one's ability to comprehend content delivered in like.

Media educators and theorists for years have been analyzing Marshall McLuhan's famous quip, the medium is the message. In some regard, McLuhan's statement may be a retort to later critics of educational media like Richard Clark (1983) who claimed that media are "mere vehicles that deliver instruction but do not influence achievement any more that the truck that delivers groceries causes changes in nutrition" (p.445). Further, communications theorists like Walter Ong (1982) not only agreed with McLuhan, but extended the meaning of McLuhan's message to also imply that the types of media people use define the way they think. Ong's notions bring to mind possible questions as to whether today's mediacentric youth perhaps think differently than previous generations, with implications as to the kinds of instructional strategies that will be successful in motivating them to learn and providing perceptual stimuli for recognition and recall.

Background

Media educators and theorists for years have been analyzing Marshall McLuhan's famous quip, *the medium is the message* (Meyrowitz, 1985). In some regard, McLuhan's statement may be a retort to later critics of educational media like Richard Clark (1983) who claimed that media are "mere vehicles that deliver instruction but do not influence achievement any more that the truck that delivers groceries causes changes in nutrition" (p.445). Further, communications theorists like Walter Ong (1982) not only agreed with McLuhan, but extended the meaning of his message to also imply that the types of media people use define the way they think. Ong's notions bring to mind possible questions as to whether today's mediacentric youth perhaps think and cognitively perceive differently than previous generations, with implications as to the kinds of instructional strategies that will be successful in motivating them to learn and providing perceptual stimuli for recognition and recall.

The increased predominance of digital technology in our daily lives is no accident. In 1996, the Federal Government mandated, through the Telecommunications Act of 1996, major changes in the way television signals are to be transmitted. Digital and high definition (HDTV) television would become the standard by 2006. In exchange for the broadcast industry having to absorb the multi-millions of dollars in cost for this conversion, the FCC also made significant favorable changes in limits on cross-ownership, which have encouraged an overall industry-wide consolidation. The end result has been a phenomenon called *digital convergence:* the combining of the telephone, the computer, and television into one technological *box*. Alan November (1998) re-labeled this new technological machinery, calling it a "Digital Combine", in obvious reference to the agricultural combine that was invented during the 1930s. Traditional farmers who worked the land by hand fought this advancing technology as depicted so well in the movie The Grapes of Wrath. In a famous scene the character, played by Henry Fonda, was complaining to the other squatters that these new Cats were pushing them off their land. November's analogy is clear. Educators who cling to (i.e. squat on) their old ways will suffer a similar fate and will be pushed off their turf if they do not learn how to co-exist with the latest technological *cat* - new media technologies that are so prevalently being used and mastered by today's youth. A change in educational techniques is inevitable. What must be done is to figure out how and when, not if, this new *combine* will be incorporated into instructional designers' thinking about the current batch of students, who are steeped in exposure to new media.

As a result of digital convergence and other new ideas, the predominant types of production techniques in use today in electronic media are changing. Encouraged by the successes of early pioneers of rapidly paced music video montages on networks like MTV, VH1, and Nickelodeon, and helped by rapid advances in technology, today's television producers regularly communicate fairly complex messages using fast-cuts and video montage (Stephens, 1996). Significant increases in viewership of these types of programs appear to be providing fertile opportunities for today's youth to practice their ability to receive and understand this fast-paced message delivery. According to Seward-Barry (1997), sleeping has become the only activity that

occupies children's time more than watching television (or, more recently, playing video games). For these reasons, a change in the way in which educators look at learning from electronic media may be warranted. This thinking appears to be incompatible with earlier communications theorists like Edgar Dale (1969), who felt that television finished somewhere in the middle of a twelve-point influence scale in its ability to convey contextual ideas. Moreover, using television in education appears to be anathema to recent spokesmen like Neil Postman (1986), who feel that it adds nothing positive to the mix and may even be detrimental to learning and cognition. However, new media that employs visual imagery supplemented by motion, sound, and computer editing is perhaps finally positioned to evolve into a similar definitional prominence to the peop le who use them, just as print media had done for the past five hundred years since Guttenberg (Stephens, 1996, p. 69). Corcoran (1981) suggested that intelligence is a skill in a particular medium and that symbolic codes used in that medium that serves communication purposes and are internalized by a receiver also serves as a authentic tool of thought. This new way of thinking may be at the root of generational differences in communication techniques and over-dependence on the right brain for thinking in today's youth. It has also brought to mind a revelation on the part of this author. Just because a student does not know the words to communicate his or her thoughts does not necessarily mean that he or she is not having any intelligent thoughts. Perhaps, the ideas are coming to these individuals in different ways. Investigation and follow-up has made some things much more clear. Educators need to look differently on communicating and educating today's mediacentric youth.

The Medium is the Message Re-visited

The idea that the learning process might be changing as the result of the types of predominant media being used is appears to be backed up by several research studies by Jonassen (1996) and others in which technology/media has been successfully evaluated as type of cognitive *mind tool*. In other words, by merging many formerly distinct knowledge situations, new media appear to be "breaking down the boundaries among various disciplines, opening new dialogues, and fostering the development of cross-disciplinary areas of study" (Meyrowitz, 1985, p. 327). These new kinds of electronic media, Meyrowitz (1985) speculated, may be "introducing our children to a different way of thinking that involves the integration of multiple variables and overlapping lines of simultaneous actions" (p. 326). This assertion proposes, among other things, that electronic media in general (and television in particular) may have already greatly reduced the influence that time and location used to have on what people know. It is, therefore, not unreasonable to propose that a transition may be in process in which the youth of today think about things, all of which appears to be at odds with the linear thinking processes associated with print media (Stephens, 1996). Further, it is also possible that today's youth may be moving away from a "one-thing-at-a-time, one-thing-after-another, and take-time-to-think world of reading" (Meyrowitz, 1985, p. 326) towards McLuhan's world of "interconnected layers of information" in which "a continual superimposition of complex contextual matrices, all arrive (sic) into the brain at an electric speed" (McLuhan, 1964, p. 91).

The Medium is the Message, Part 1

Perhaps the best way to analyze the impact of new media on teacher youth in the digital age is to re-look at McLuhan's *medium is the message* ideas with a view to some modern interpretations. One interpretation of the medium is the message concept involves how we should evaluate the innate goodness or badness of the media we use. In general, this assessment can be interpreted in four ways. Technology (As an aside, the terms technology and media/new media should be inter-changeable here) needs to be assessed in the following ways:

- What, if anything, new does it bring to the table (i.e. what good is it doing for the culture who is using it?)
- What does its introduction into a culture make obsolete?
- What, if anything, does it bring back that might have been obsoleted by a previous new technology?
- What happens when people using this new technology over-depend on it?

In most general terms, this interpretation of the usefulness of technology has very specific implications for educators who are looking into teaching and communicating with today's media-centric youth. First, new media provide complete interactivity at a very small price. Without having to leave their classrooms, students can interactively explore cloud formations that occur during major hurricanes, compare bone structures between humans and apes, look at generational genetic similarities, and explore the human body in very dramatic form. Streaming video and the Internet are helping to redefine the distribution of educational materials. For example, the National Library of Medicine at the University of Maryland has put online the Visible Human Project, in which students can view an actual human's anatomy from the top of his head all the way throughout to his feet, using cat scan technology that has been exported to a Quick Time Video. These virtual field trips are becoming increasingly prevalent and commonplace on the Internet. Second, new media technologies (the Internet, in particular) appear to empower and encourage students to communicate using the media. Producers of new media are offered broad new opportunities to immediately practice their skills through ready-made distribution channels for a new population of motion picture and video practitioners. Marc Davis from the MIT Media Labs likened his phenomenon to that of younger musicians practicing in their garage. "In the spirit of garage bands, the Internet and new video technologies provide ready-made distribution channel for a new pop ulation of motion picture (and video (sic)) producers, as practitioners of garage cinema" (Davis, 1996). A more famous example was the way that the Blair Witch project got off the ground, using the Internet first as a means to introduce and market the product prior to its general release in major movie houses across the country. Several Internet sites like Always I.com are popping up that encourage amateur producers to post their work. No longer do today's youth have to wait to grow up and move to Hollywood in order to get their works published. These new opportunities are encouraging youth all over the country to create and communicate using media technologies. Classroom teachers need to tap into these opportunities and role models to make connections with their students, who are already spending considerable amounts of their leisure time in these activities.

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If one follows John Keller's ARCS motivational model (Keller, 1983), it shouldn't be too hard to see how relevance and success with new media may be translated into making successful connections with today's mediacentric youth. A word of caution - new media cannot be looked at without also keeping in mind the fourth law of media evaluation mentioned previously. Over-depending on new technologies does have its downside. New media tends to affect right-brain development, whereas text-based cognition is left-brain. An over-dependence on one side or the other is not fully developing one's potential and can leave a child ill equipped to fully function in the world. As Robert Doman, Jr. (1984) very often preached, one should teach to one's strengths and remediate any weaknesses, and not the other way around. A failure to do this is doing our youth a disservice.

Teach to the Strengths, Remediate the Weaknesses

The obvious point here is that educators should teach to a student's strengths (i.e. right-brain development) I order to remediate their possible weaknesses (i.e. text-based or left-brain cognition). Use visual skills to get at textual. Using media as a cognitive development tool has incurred significant success in several literacy projects recently. These projects utilized students' fascination with the technology of television and video production as a hook to encourage them to develop their non-verbal (i.e. oral and visual) story-telling skills that eventually translated into their acquiring increased text-based communication abilities. These students haven't needed too much prompting to want to write about their own personal visual experiences and/or story lines. Marco Torres' work with inner-city youth in east Los Angeles, as well other similar projects in San Antonio, Texas, and in Ohio have been very successful in bringing otherwise lost children back into educational the fold so-to-speak. By first teaching students how to communicate non-verbally and then having them utilize their own projects to develop their verbal communication skills has paid big dividends.

Remediating weaknesses and learning disabilities appears to be another way that new media has helped shape personality and development. For example, researchers have found that video games can interact with subjects to positively influence cognition. Physicians and researchers at the Medical Center at the University of Eastern Virginia have been able to attain significant results in treating ADHD students with a non-invasive, non-medical treatment using video games to increase attention spans and to increase cognitive activity. Subjects are hooked up to bio-feedback apparatus that monitors attention while they play popular video games. As subjects' attentions drift, the feedback mechanism makes the joystick attached to the game more difficult to operate. The subjects are prompted to again attend to what they are doing. They are incented to stay on task because of a built-in desire to play the game. Positive long-term effects appear to warrant the use of this program to cause subjects to change their cognitive behavior (i.e. attending to a task) relative to capabilities and habits prior to entering the program. Most can be taken off therapeutic medications in the process.

Research appears to back up these projects. While some have deprecated the over-use of media (Dale, 1969; Neuman, 1976; Postman, 1986)), others (Gropper, 1966; Nugent, 1982; Paivio, 1986) have found that the use of video media can actually increase one's retention for stories presented via the combination of visual and auditory information that those presented through only a single source. It is, perhaps, that new media is finally positioned to take its place in education because the availability of easy-to-use production techniques are finally beginning to rival those in other communication vehicles like word processing. What appeared to have taken over five hundred years (from the invention of the printing press to word processing) has only taken video media a little over fifty to accomplish (Stephens, 1996).

The Medium is the Message, part 2

A second interpretation of the medium is the message concept is that the medium one uses to communicate not only helps to define the message, but also those who utilize that medium. The impact of new media in this manner can be demonstrated in several ways. For example, some researchers have looked at this interpretation and came up with the idea that increased usage and dependence on this form of media might be a two-way street. Two Stanford University researchers have looked into media interaction and examined the way people respond to media and media events. While we can readily apply knowledge gained from media experiences to real life, Reeves and Nass (1996) found that we also apply experiential knowledge gained from real-life to the use of media. Among other things, they examined cultural experiences like politeness, flattery, and negativity and found that people essentially react to media in identically the same ways they do to other people. First, their studies indicate that when a computer asks a user about itself, users will respond more positively than when a computer asks about how well another computer is doing. In other instances, people believe they did better on a computer-based test when the computer flatters them than when the computer offers no evacuation. Moreover, people seem to like a computer more, and believe it did a better job when it flatters them, whether or not the praise is warranted had no effect. Third, people were found to pay attention to, and remember negative media better than positive media. Additionally, people were found to have a better memory for information that follows negative media than for information that follows positive media and vice versa. Lastly, Nass and Reeves showed several instances when media personalities are more often identified solely through the media roles they play, to the extent where they cannot cause people to identify them by their real names. Perhaps what the *media equation* is telling us is that we need to broaden the context of what it means to be literate to new forms of media and to relate to media just as if it is a real agent in our daily lives.

The Role of Media in Education

In spite of these findings, researchers and educators looking into the intrinsic instructional value of video media have presented conflicting views with regards to the role visual perception plays in attention, motivation, and recall. There have been several studies that looked into the potential benefits mediated coding systems have on cognition (Davis, 1999; Nugent, 1982; Paivio, 1986; Seidman, 1981; Walma van der Molen, 2000). On the other hand, early theorists have had little good to say about

television's ability to bring anything new to the table with regards to using it as an educational medium (Berlo, 1960; Calvert, 1989; Ide, 1974; Kozma, 1986). This may have been due to the limitations imposed by the technology in use at the time. Technological advances in commercial television production techniques that allow today's producers to readily integrate fast-cuts and montage have added to this benefit/conflict controversy by providing them tools to more easily communicate complex thought using a non-verbal narrative structure. A rapidly cut montage passage has been found to add clarity to a passage because the interpretive whole of the segment is more than the sum of its parts (Hitchon, 1994; Stephens, 1996). In other words, it is the composite whole of all the visual images in a passage or segment, considered at all once, that gives extended meaning to the montage. In addition, newer ideas on editing techniques have evolved that emphasize more the perceptual continuity of a non-verbal composite narrative structure rather than the classical point of view, which stressed the importance of applying strict editing rules in order to obtain smooth transitions between successive shots (d'Ydewalle, 1990).

Fast-seeing as Cognitive Activity

Studies need to be designed that will that will, hopefully, extend into an educational setting recent studies of casual viewers' ability to absorb and comprehend complex, rapidly-presented visual passages. What can educational video producers learn about presentation speed and editing from current commercial television production trends that incorporate an ever-increasing number of these fast-cuts and montage passages? Is it possible to recognize, recall, and get the gist of intellectual content solely from rapidly paced visual montage that is not supplemented with some form of verbal narrative? How does one's learning/cognitive style effect his or her ability to process fast-cuts/montage video presentations in a classroom setting? Most of the previous studies into the impact of fast-cuts/montage have concentrated on commercial television viewing (Bryant, 1991; Lang, 1998; Lang, 1999; Lang, 2000; Zillman, 1991). While there have been occasional studies (Keller, 1976) into the use of fast cuts/montage in an instructional setting, they have looked at viewers as a collective whole with little regard for differences in audience personalities, capabilities, cognitive style, or personal traits. Further, the subjects of all earlier studies in either setting have been college-level students enrolled in communications classes (Keller, 1976; Lang, 1999; Lang, 2000; Reeves, 1996), rather than school-aged students viewed in their original educational environments.

Construct-related Validity of Leisure-time Studies

Media researchers have looking into the benefits of rapid presentation have had to contend with a conflicting view that holds that the relatively fast presentation speed of televised programs creates an environment that may be detrimental to attention and recall (Alwitt, 1980; McCollum, 1999; Neuman, 1976). To the contrary, others have shown that presentation speed and rhythmicity in leisure-time media can actually heighten enjoyment, enhance motivation, and can "play an important part in determining the affective or emotional response of message receivers" (Seidman, 1981, p. 49). Intraub's (1999) recent studies into conceptual masking have shown that humans are able to recognize and recall pictorial presentations when a minimal amount of lag time separates individual images. There are those who believe that there have been several successes with childrens' programs that offer rapid and rhythmical presentation speed (Anderson, 1979; Anderson, 1983; Anderson, 1988; Pearl, 1982). Moreover, it appears that there exists a direct link between one's ability to comprehend televised messages and, in fact, overall academic achievement and one's innate cognitive (i.e. personal) tempo (Flowers, 1995; Shaffer, 2000, August 19; Snow, 1965; Wagely, 1978). Others contend that presentation speed in instruction may add interest to otherwise uninspiring content (Canelos, 1986, January; Edgar, 1997; Hawkins, 1997; Hill, 1993).

Still others have looked into presentation speed as its own construct, comparing/combining it to/with arousing content (Lang, 1999; Lang, 2000). Further, Lang (1999; 2000) discussed the effect of adding interesting and arousing content as having a positive effect on cortical arousal and, therefore, recall and recognition. In additional studies, Lang (2000) alluded to future research that should continue to probe the shape of the relationship between presentation rate and recall and test even faster rates of edits to determine whether there is a point at which memory begins to decline. Her studies suggest that producers who want their messages to be remembered should create arousing messages that are slow or medium paced, or calm messages that are medium or fast paced. She concluded that producers should not create messages that are either calm and slow paced or arousing and fast paced (Lang, 2000). The current study will look into the effect of integrating increased message presentation speed directly into instructional messages in an educational environment whose content might be considered by some students as less than arousing. It should also be noted that Lang (2000) considered cuts to be *fast* if they changed at a top rate of eleven to twelve per thirty-second segment (i.e. one every 2-3 seconds). While these studies are important in their own right, perhaps their speed of presentation may not be fast enough, considering an observation by this author that current trends in television editing techniques tend to present images almost ten times as fast.

Lack of Correlation in Educational Settings

These investigations into the effects of casual television viewing have not translated too well to the educational setting (Salomon, 1994). As Kozma (1986, p. 14) had stated, "viewership should not be confused with learning". However, once one delves deeper into these studies, four possible reasons for this lack of generalizability become apparent. First, the reputation commercial television has held for being nothing more than an entertainment device has certainly hurt its reputation in educational circles and has caused detrimental pre-conceived notions about how viewers are to be properly introduced to televised content (Wetzel, 1994). Second, many of the schema used in commercial television are considered by some to be nothing more than prototypical, trite, and overly familiar formulas that reduce the attention and concentration because they have been over-learned (Anderson, 1979; Langer, 1979). In these cases, encounters with overly familiar information formats "lead one to revert to a mindless routine in which the material is ignored or receives a low level of attention" (Wetzel, 1994, p. 169).

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This alleged over-familiarity with format has lead many educators to believe that viewers will have difficulty responding appropriately to educational televised presentations, unless some form of intervention is used (Wetzel, 1994). Third, in many studies into casual viewing, there has been a tendency to lump all viewers into a single category (Lang, 1998; Lang, 1999; Lang, 2000; McLuhan, 1964; Neuman, 1976; Tyner, 1998; Walma van der Molen, 2000). Classical instructional models tend to validate the value of segregating learners and classifying them by their individual differences (Gentry, 1998; Joyce, 2000).

The fourth, and possibly most important reason for the lack of correlation between studies of casual viewing and those performed in an educational setting is that the learning environment is thought to present a different set of circumstances - a different view if it were. This is based on the importance placed on the medium to be evaluated as to its unique ability to bring about some type of alteration of intellectual behavior or thinking process. Although many of the symbolic (i.e. intellectual) combinations found in non-verbal endeavors such as music, painting, and dance can be displayed directly on television, there has been some question as to the extent to which transformations in the thinking process are created in viewing, and whether any changes that might occur are of any significance (Ide, 1974). In other words, television has not been given credit for yielding any new intellectual construct of its own. Previous studies into the value of using television as a medium for intellectual change have demonstrated mostly *negative progress* (i.e. television does not actually *interfere* with learning, nor is it no less effective than other forms of media) (Thompson, 1996; Wetzel, 1994).

Rapid Presentation as a Construct

Although there appears to be a dirth of studies looking into the conflict/benefit of rapidly-presented visual images in educational settings, there does exist some research that clearly demonstrates the potential instructional value of video that is aided by a systematic variation of presentation speed of as a valid instructional strategy (Comstock, 1978). Intraub's (1999) experiments into individuals' ability to understand and remember briefly glimpsed images dealt with pictures that were not or only very loosely related. The use of montage implies that the pictures included are at least conceptually related. Intraub (1999) indicated that subjects might be able to hold more than one picture at a time in a conceptual buffer, so long as the "series was not too long" (p. 57), and the notion that the included pictures were related to one another. It appears that humans may have the ability to construct meaning from these types of presentations through the use of interpretive coding (i.e. the process by which meanings are put together from specific parts of visual communications). In describing his research in teaching Native Americans how to use film to communicate meaning, Sol Worth (1997) noted that the process of coding has been neglected in the study of most of the fine arts, including film. His comments appear to be alluding to the fact that the form of a medium might be what carries meaning. In an earlier attempt t o extending this notion to television, Pearl (1982) discussed the relationship between form and content and admitted that it is the form (that is, the way it uses verbal and linguistic codes), not the content, of television that is unique. However, she also cautioned that form and content cannot always be distinguished - "no more than grammar and meaning in any verbal language can" (p. 24). However, she went one to say (Pearl, 1982) that some forms are unique to the medium and apply syntactical meaning only in the context of that medium. For example, slow motion is not real and its meaning must be learned. However, once learned, studies have shown (Barnett, 2000) that these formats become generally used by p eople in their own thinking (i.e. when one speaks of applying slow motion to a video message, it generally carries the same contextual or emotional connotation). The current study tries to apply the same logic to fast cuts and video montage to see if this presentation format can be interpreted in such a way so as carry the same or different implied meanings than slower paced messages.

Previous research into using presentation speed and movement in educational multimedia has been the subject of controversy in the literature (Downs, 1989). Downs indicated that there might be a new wrinkle on evaluating the findings: one must try to "determine if children are attending to motion but not expressing it" (p. 97). She alluded to possible future studies that should include additional cueing strategies to determine their effect on learning. Under very broad interpretation, the speed of message presentation of motion and edits/cuts may be considered a form of cueing (Lang, 2000). Previous research also referred to presentation speed in a similar way, referring to it as a message's domain "attribute" (Downs, 1989, p. 3). Salomon (1979) acknowledged that media attributes are that "within the mediated stimulus, possibly shared to some extent with other (forms of (sic)) media, and makes the presented information more comprehensible or better memorized by learners of particular characteristics" (p. 5-6). Under Salomon's definition, *symbols* include "most objects, marks, events, models, or pictures" (p. 29). It is assumed in this study that the rhythmic patterns afforded by fast-cuts are an *event*. Where the current study varies from Downs' is that it takes the interrogation of symbols and attributes to another level. The current study aims to show that rapid presentation speed (also referred to as fast-cuts) may be considered an invaluable attentional attribute of media and is, therefore, capable of being studied separately to discover its contribution to learning. In short, this study aims to determine to what extent the (rapid) presentation speed of video images either aids or interferes with learning, considering the changes that appear to be taking place in an ever-increasing mediacentric society. Another consideration is the way in which the effect on learning is to be measured. Mayer (1996) indicated that words might not serve as proper feedback format to visual motion cues. Archer (1965) proposed that other evaluative vehicles be designed that are more closely aligned with the visual processing because something may be lost in the translation to verbal. The current study will utilize a combination of verbal and non-verbal methods to evaluate its results that are more closely attuned to the visual perceptual process.

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New Media, a new View of their Impact

Changes in media technologies create the need for taking a new look at it potential impact on education. Child development psychologists like Robert Dorman, Jr. (1984) have noted that it is no accident that tottlers learn more in their first five years than in any other time of their lives. The fact is that they perceive and process images very rapidly - at a rate that equals or exceeds a new one every 100-300 milliseconds. These observations beg the question as to what happens to this rapid learning process just about the time that a child enters his or her formal educative years. What do current educational strategies do to slow the learning rate down? Has previous research been hampered by a lack in technology to implement and subsequently evaluate rapid presentation as an instructional strategy? Some have expressed this opinion in the past. Loftus (1982) found only one doctoral dissertation, and no published work had taken place up to the time of publication of his review of the literature in 1984. The current author has found one more in a very recent research of the literature, and that one also took place before Loftus' work. The truth is, almost no research has been done in this area since then.

On the other hand, recent contemporary theories about fuzzy trace memory (Brainerd, 1990; Brainerd, 1994; Reyna, 1994) might be the key to looking at rapid presentation as an instructional strategy. Research has uncovered that as a child progresses through developmental stages, s/he begins to loose specific details of episodic memory, but general details of contextual information last much longer and actually become the sole extent to which a person recall previous events. Research into this child development phenomenon has alternately given rise to new thinking about human memory in educational settings. In short, fuzzy trace proposes that there might be two distinct memory tracks, one that deals with verbatim information, and another that tracks essential contextual (i.e. gist) information that aids in the process of synthesis and analysis. These studies have indicate that both verbatim and gist memory can be stimulated with very short bursts of visual stimuli. While verbatim memory might be subject to masking limitations, gist memory has been found to be much more durable. It is obvious that more work in this newly created field needs to be done before any specific changes in educational strategies can be made. However, successes in experiments dealing with numbers (Brainerd, 1994) and text (Reyna, 1994) are promising.

Summary

In spite of previous experiments into memory associated with rapidly-presented visual messages, the time might be right to revisit this field. We appear to be living in an age where information overload might be in vogue . Previous experiments were hampered by the lack of any stable technology to recreate for testing purposes in a consistent manner rapidly-presented visual imagery. That no longer appears to be problem. According to some, today's youth who live in this world not only appear to be attracted to the rapid pace, but also might have learned how to cope with it and utilize it as a more efficient way to take in information. Child psychologists studying right-brain activity (Shichida, 1993) have known for years that image training in infants produces remarkable mathematical and reasoning capabilities. In fact, the right brain can process cognition without any fixed memory. The right brain functions beyond one's consciousness. Processing rapid montage appears to be a right brain activity. In short, rapid montage video may be able to play a significant role in the learning process because it matches three essential elements of perception and learning:

- Frequency
- Intensity
- Duration

The rapid changes in visual stimuli have been shown to gain viewers' attention, and cause viewers to concentrate longer. Educational research may well benefit from discovering whether visual stimuli presented at an increased delivery pace can provide similar instructional outcomes in a more efficient and stimulating manner (Cobb, 1997). This is something that might be a more practical outcome measurement for using video media than achievement alone.

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